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The likelihood of disease spread from humans to livestock through animal feed manufacturing

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Brief reviewed by a multidisciplinary, multi-sector team of experts.

Summary of Findings:

- To date, no documented cases of disease spread to livestock from infected humans involved in animal feed manufacturing have been found in published literature, including peer reviewed journals.
- While two studies[1,2] document animal feed as a source of reported zoonotic pathogens (disease agents that can be passed between animals and humans), neither of these studies identify infected humans involved with feed manufacturing as the likely cause.
- The hypothetical risk that livestock can become sick, from pathogens spread by infected humans involved in manufacture of livestock feed, can be reduced by facility design and sanitation practices (i.e., providing accessible toilets and good personal hygiene such as hand washing).

Background

There are two principal segments of the United States (U.S.) animal feed industry: pet food (primarily dog and cat); and livestock feed.[3] A proposed rule[4] from the U.S. Food and Drug Administration (FDA) aims to improve the safety of animal feed products; this rule is known as the Current Good Manufacturing Practices (CGMPs) and Hazard Analysis and Risk Based Preventive Controls for Food for Animals. The proposed rule covers five areas to ensure the safety of animal feed: (1) hygienic personnel practices and training; (2) facility operations, maintenance, and sanitation; (3) equipment and utensil design, use, and maintenance; (4) processes and controls; and (5) warehousing and distribution. One component of the rule is to ensure that animal feed is safe and ill employees will not cause illness or injury to animals receiving the manufactured feed, similar to the existing standard for human food production. Section 507.14(a) of the rule would require that "employees with an illness or open lesion that could reasonably be a source of contamination of animal food report the condition to their supervisor and refrain from performing activities that could result in contamination of animal food."[4] This brief focuses on the likelihood of livestock disease resulting from feed contamination with disease-causing agents originating from personnel involved in the feed manufacturing process.

Review of English language scientific literature

No published studies were found that identified the likelihood of humans transmitting diseases to livestock, specifically through animal feed. A literature search was conducted for *documented cases of transmission* of diseases from human to animal as well as *potential transmission* from human to animal, resulting in a detailed review of over 20 documents. The search was performed through databases – PubMed, University of Minnesota Library (MNCAT Discovery and Library catalogue), Google Scholar and Google search engines – for English language peer reviewed publications and books.

While the literature review[i] included any disease cases found to be reported anywhere in the world, an additional book[5] review was limited to major recognized livestock zoonoses – diseases that may be transmitted between humans and livestock – such as, anthrax, brucellosis, and influenza. Cases that were reported but did not have evidence to demonstrate

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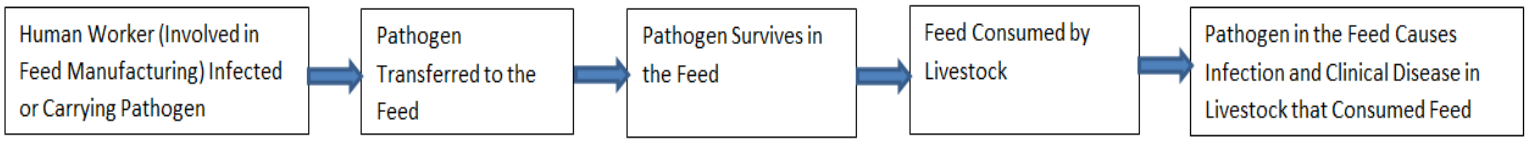
the human-to-animal transmission were ruled out. Cases, and their transmission routes, were explored if they had evidence of disease transmission from human to animal.

The hypothesis of disease spread from humans, involved in feed manufacturing, to livestock would mean that the feed itself would be acting as a vehicle for non-contact spread of the infectious organisms. The basic pathway for disease spread has been simplified in the figure below.



Key findings of literature review

1. Hypothetical transmission routes can be described for disease spread from humans to animals via feed manufacturing. Potential transmission routes are:
    a. Feed contaminated by human feces (fecal-oral transmission);
    b. Feed contaminated by human urine; and
    c. Feed contaminated with human body tissues, fluids, and secretions (other than urine and feces).
2. No cases were identified of disease spread from infected humans, involved in animal feed manufacturing, to livestock through animal feed.
    a. Cases of diseases transmitted from humans to livestock have rarely been reported. Only 19 peer reviewed articles were found to have documented cases of diseases with evidence of human-to-livestock transmission.
    b. Two studies[1,2] showed animal feed as a source of zoonotic pathogens; however, neither study reported that human involvement in feed manufacturing was the source of the pathogens.
3. If basic toilet facilities and hand washing stations are readily available for workers at feed manufacturing facilities, the potential feed-contamination risk (with pathogens from humans) is reduced.
4. Based upon this literature review, the likelihood appears unlikely for livestock illness to result from an infected worker in a feed manufacturing facility for the major recognized zoonoses in horses, cattle, goats, sheep, swine, and poultry.
5.

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